Post-Test - Solutions
Geometry

1. How many points determine a plane?

   Solution: 3 points

2. Find the distance from the point A=(-1, 4) to the point B=(2, 8). Show work.

   Solution: The distance is given by $\sqrt{(-1-2)^2+(4-8)^2}=\sqrt{9+16}=\sqrt{25}=5$ **units.**

3. Give the general formula for finding the midpoint of a line segment.

   Solution: The formula for finding the midpoint of the line segment joining the points (x_1, y_1) **and** (x_2, y_2) **is given by** $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$**.**

4. We say that two angles are supplementary if and only if <u>**the sum of their measures is 180º**</u>**.**

5. List at least four methods for determining whether two triangles are congruent.

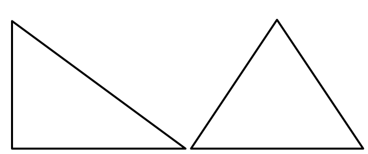
   Solution: ASA, SSS, AAS, and SAS

6. Suppose two parallel lines are cut by a transversal. What can you say about the alternate interior angles?

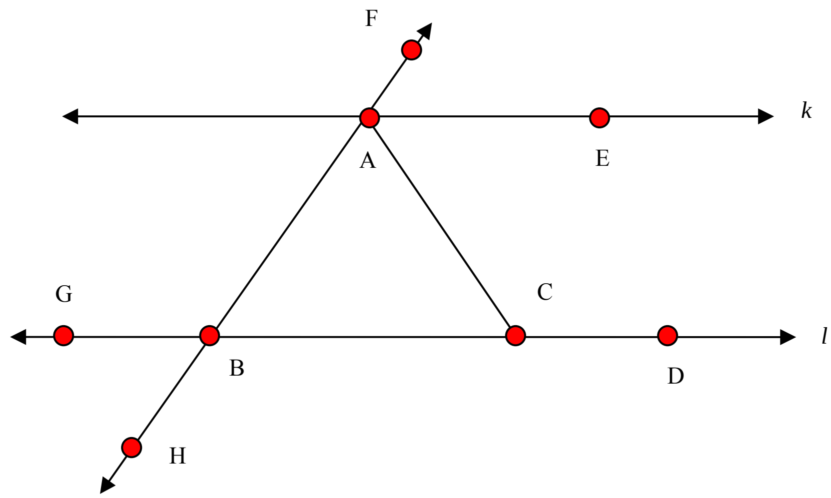
   Solution: The alternate interior angles are congruent.

7. Congruent triangles have the same area. State the converse of this statement and show by example that it is false.

   Solution: The converse statement is "Triangles that have the same area are congruent." The formula for computing the area of a triangle is ½ of the product of its base and height. The two triangles shown below have the same height and base, and consequently, they have the same area. However, they are clearly not congruent since one of these triangles is a right triangle the other triangle is an equilateral triangle.



8. The lines *k* and *l* are parallel in the figure below.



$m\angle GBH = 70^o$ and $m\angle EAC = 40^o$. Give the measure of angle FAE. Justify your conclusion.

Solution: $m\angle FAE = 70^o$.

Possible Solution Justification: The lines *k* and *l* are parallel, so the alternate exterior angles $\angle GBH$ and $\angle FAE$ are congruent. Therefore, $m\angle FAE = 70^o$.

Alternate Solution Justification: Since $\angle EAC$ and $\angle ACB$ **are alternate interior angles, then** $m\angle ACB = 40^o$**.** $\angle GBH$ and $\angle ABC$ **are vertical angles so** $m\angle ABC = 70^o$**. Since the sum of the angles of a triangle must equal 180º, then** $m\angle BAC = 70^o$**. Since the sum of supplementary angles must equal 180º, then** $m\angle FAE = 70^o$**. Hence,** $m\angle FAE = 70^o$**.**

There are many other approaches to solving this problem.

9. Two triangles are similar if and only if **their corresponding angles are congruent and the lengths of their corresponding sides are proportional. Two triangles are similar if and only if they are the same shape, but not necessarily the same size.**

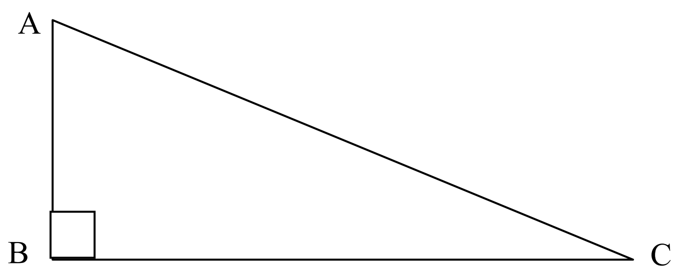
10. What can you say about the point of intersection of the diagonals of a parallelogram?

    Solution: The point of intersection of the diagonals of a parallelogram is the midpoint of the diagonals of the parallelogram. Or…the point of intersection of the diagonals bisects each diagonal.

11. Explain how each of the following transformations affects the area of a triangle.

a. Dilation **A dilation by a factor of c affects the area of a triangle by a factor of c^2.**
b. Reflection **no effect**
c. Translation **no effect**
d. Rotation **no effect**

12. The right triangle ABC is shown below.



Given: $\overline{AC} = 6$ and $m\angle C = 30^o$. Find $\overline{AB}$ and $\overline{BC}$.

Solution: $\overline{AB} = 3$ units and $\overline{BC} = 3\sqrt{3}$ units.

Possible Solution Justification: ΔABC is a 30-60-90 triangle. Since the measure of the hypotenuse is 6 units, then the measure of the shorter leg $\overline{AB} = 3$ units (the hypotenuse is twice as long as the shorter leg in a 30-60-90 triangle). Since the measure of the longer leg is $\sqrt{3}$ times as long as the shorter leg, then $\overline{BC} = 3\sqrt{3}$ units.